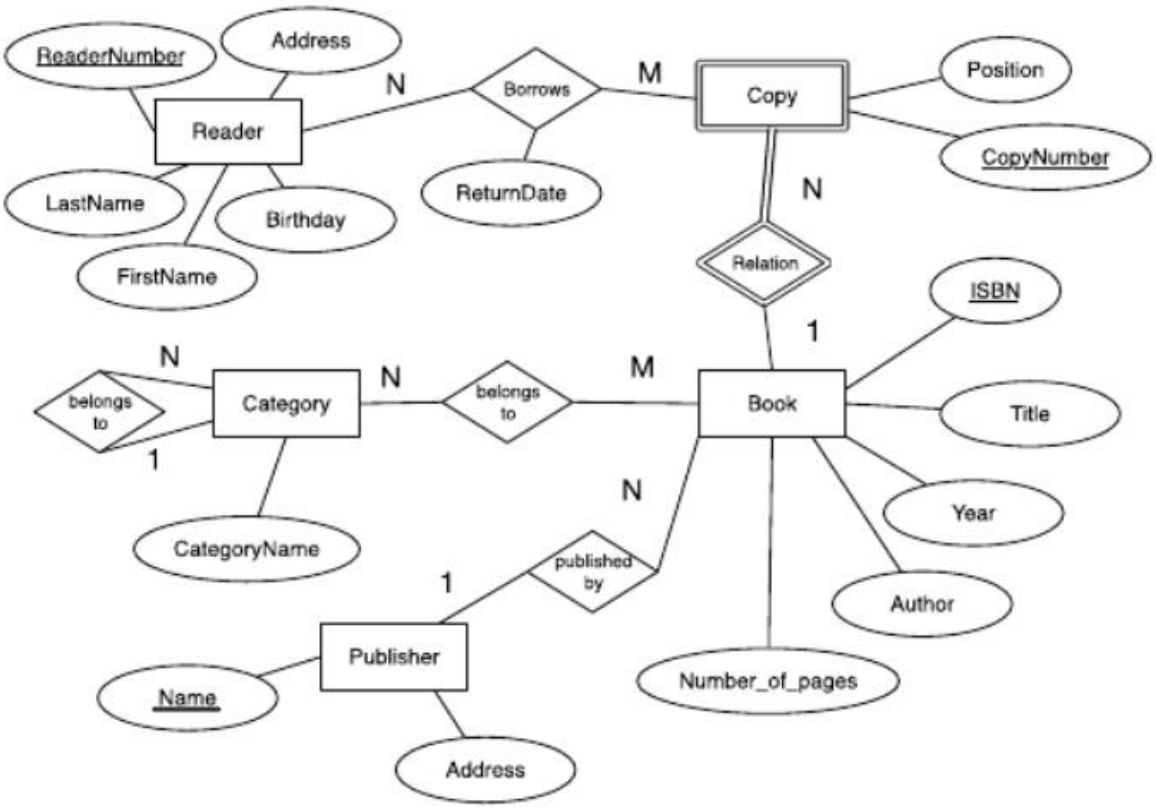
1) Why any relation in a relational schema has at least one key?

All keys are unique. So, a key ensures uniqueness of each row. The key can be represented as a whole entry, but it would be better to find out the minimal set of attributes to distinguish entries.

2) What happens when one implements the ER diagram from previous homework (Homework #2, Library system) with a single relation (instead of creating distinct relations for entities and relationships)?

If a separate relation is not created for a book and its category, information about some books will be duplicated because one belongs to several categories. It will be costly and inconvenient to change the name of the category because we will need to find all entries with this category instead of replace attribute in one entry in the relation with categories.

3) Translate all ER diagrams from previous homework into relational schemata.



Reader (ReaderNumber, Address, LastName, Birthday, FirstName)

Publisher (Name, Address)

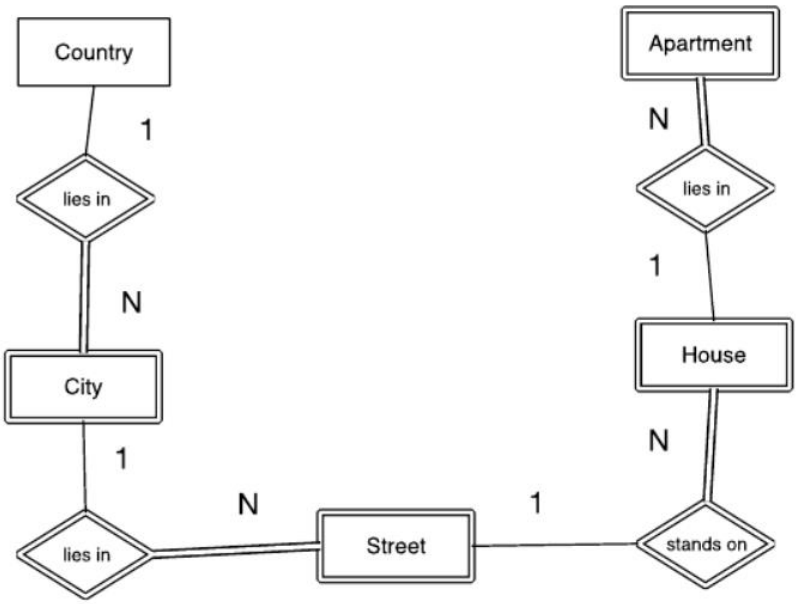
Category (CategoryName, ParentCategory)

Book (ISBN, Title, Year, Author, Number_of_pages, PublisherName)

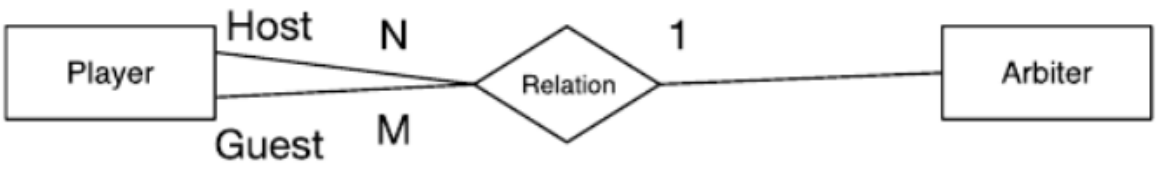
BookCategory (ISBN, CategoryName)

Copy (ISBN, CopyNumber, Position)

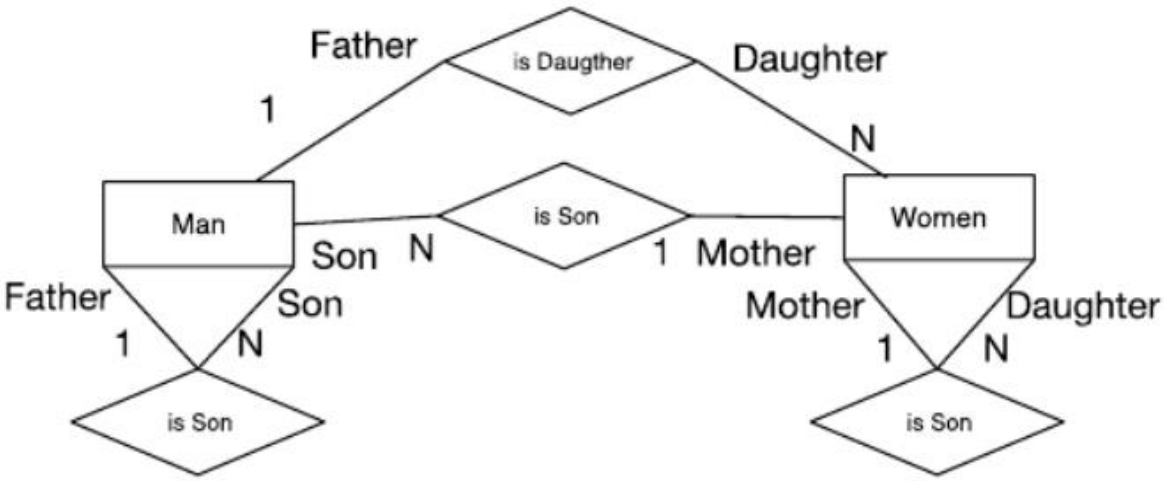
BorrowsCopy (ReaderNumber, ISBN, CopyNumber, ReturnDate)



Apartment (Country, City, Street, House, Apartment**)**

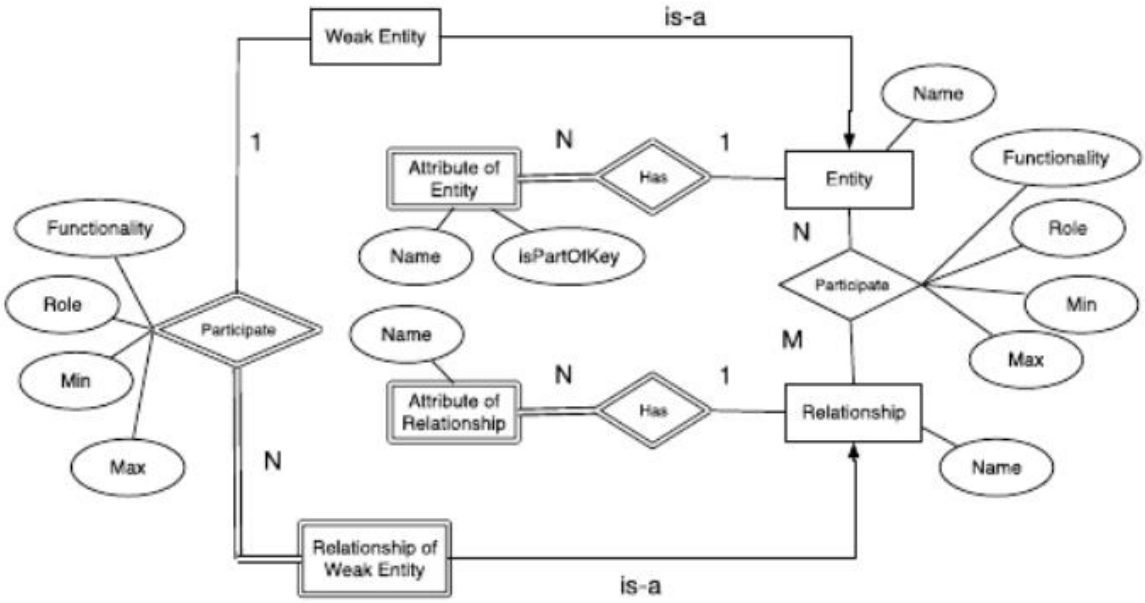


Game (Host, Guest, Arbiter)



isSon (Son, Father, Mother)

isDaughter (Daughter, Father, Mother)



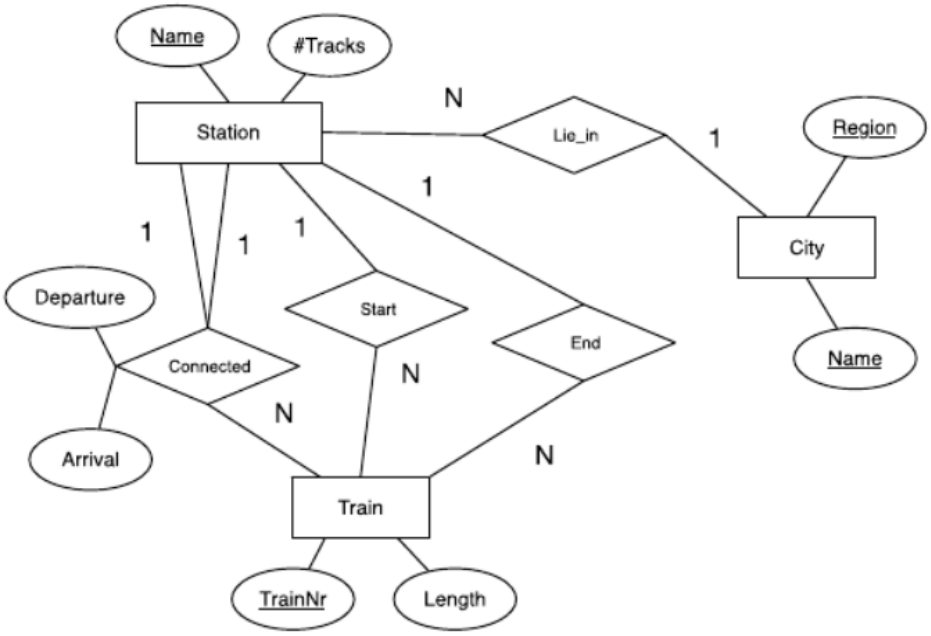
AttributeOfEntity (AttributeOfEntityName, EntityName, isPartOfKey)

AttributeOfRelationship (AttributeOfEntityName, EntityName, isPartOfKey)

EntityRelationship (EntityName, RelationshipName, Functionality, Role, Min, Max)

WeakEntityRelationship (WeakEntityName, RelationshipName, Functionality, Role, Min, Max)

4) Translate given ER diagrams into relational schemata.

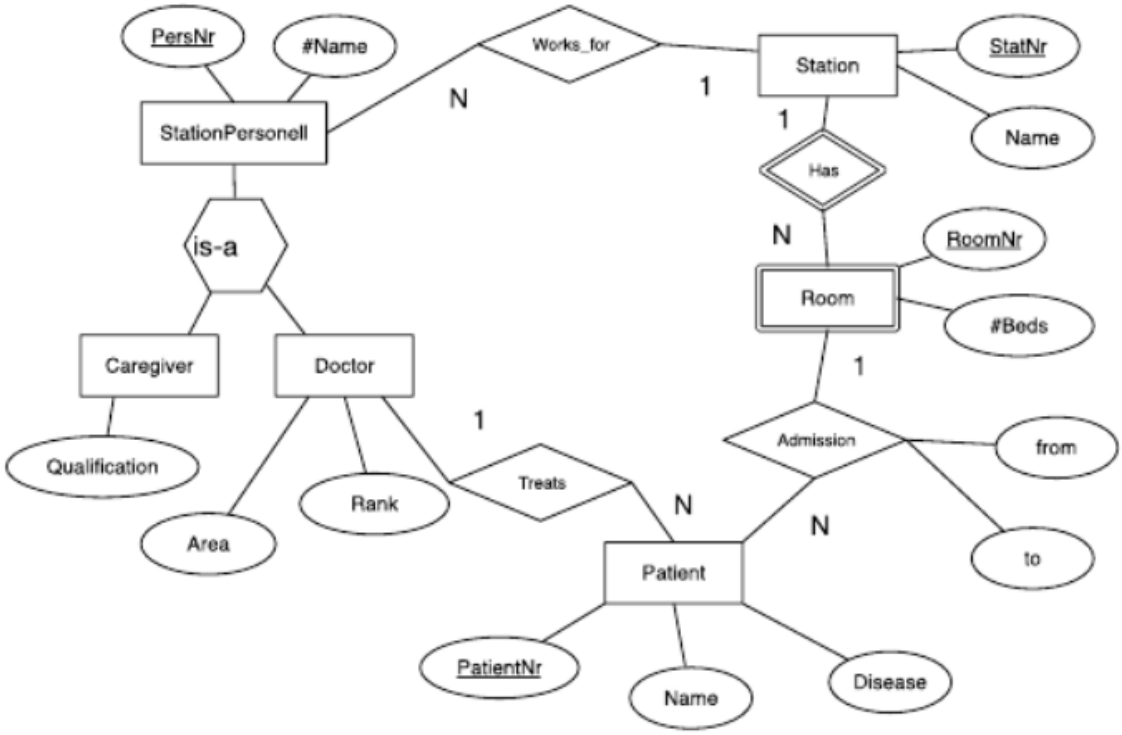


Station (Name, #Tracks, CityName, CityRegion)

Train (TrainNr, Length, StartStationName, EndStationName)

Connected (TrainNr, ArrivalStation, DepartureStation, DepartureTime, ArrivalTime)

We do not need a separate table for City because City does not have any attributes that are not the primary key.



Patient (PatientNr, Name, Disease, DoctorPersonNr, from, to, RoomNr, StatNr)

Station (StatNr, Name)

StationPersonell (PersonNr, Name, Station) (includes caregivers and doctors)

Caregiver (PersonNr, Qualification)

Doctor (PersonNr, Area, Rank)

Room (RoomNr, StatNr, #Beds)